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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,666	12/17/2003	Andreas Fischer	015290-757	5341

21839 7590 08/24/2005

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EXAMINER

MACARTHUR, SYLVIA

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/736,666

Applicant(s)

FISCHER ET AL.

Examiner

Sylvia R. MacArthur

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 23 and 24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/14/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of claims 1-22 in the reply filed on 6/8/2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5,7-9,14-16,23,and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Hubacek(US 6,475,336).

Hubacek teaches an electrostatically clamped edge ring assembly for plasma processing.

Regarding claim 1: The assembly comprises a conductive lower ring 15, a ceramic intermediate ring 17, the intermediate ring is adapted to be attached via the lower ring to an RF electrode, an upper ring 18 the upper ring overlying the intermediate ring, wherein the upper ring has an upper surface exposed to an interior of a plasma reaction chamber, see Fig.1

Regarding claim 2: The assembly of Claim 1, wherein the intermediate ring is made of aluminum oxide.

Regarding claims 3 and 14: The assembly of Claim 1, wherein the intermediate ring/upper ring is made of quartz, silicon, silicon carbide or aluminum oxide, see col. 6 lines 17-28.

Regarding claims 4,5 and 20: The assembly of Claim 1, wherein the conductive ring is made of aluminum or alloy thereof, see col. 6 lines 28-49.

Regarding claim 7: The assembly of Claim 1, wherein the conductive ring has a plurality of holes configured to bolt the conductive ring to the RF electrode, see col.4 lines 28-33.

Regarding claim 8: The assembly of Claim 1, wherein the conductive ring and the intermediate ring have a plurality of holes configured to bolt the intermediate ring to the conductive ring, see col.4 lines 28-33.

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Regarding claim 9: The assembly of Claim 1, wherein the conductive ring has a substantially L-shaped cross-section, see Fig. 1.

Regarding claim 15: The assembly of Claim 1, wherein the upper ring has a portion extending under a substrate when the substrate is located on the substrate support, see Fig. 1.

Regarding claim 16: A plasma processing apparatus comprising:

a processing chamber;

a power source which energizes process gas in an interior of the processing chamber into a plasma state for processing a substrate;

a substrate support which supports a substrate within the interior of the processing chamber;

a conductive lower ring;

a ceramic intermediate ring, the intermediate ring overlying the lower ring,

the intermediate ring adapted to be attached via the lower ring to an RF electrode

an upper ring, the upper ring overlying the intermediate ring, wherein the

upper ring has an upper surface exposed to an interior of a plasma reaction chamber, see col. 3 line 49 and 4 line 60.

Regarding claim 18: The apparatus of Claim 16, wherein the lower ring is made of aluminum or alloy thereof see col.6 lines 17-28.

Regarding claim 19: The apparatus of Claim 16, wherein the intermediate ring is made of aluminum oxide, see col.6 lines 17-28.

Regarding claim 20: The apparatus of Claim 16, wherein the upper ring is made from a material selected from the group consisting of quartz, silicon, silicon carbide, paphite and aluminum, see col.6 lines 17-28 .

Regarding claim 21: The apparatus of Claim 16, wherein the plasma chamber is a semiconductor plasma etching apparatus, see col.3 lines 40-48.

Regarding claim 23: A method of reducing process drifts on a plurality of substrates in a plasma processing system comprising:

positioning a substrate in a plasma processing apparatus comprising:

a processing chamber;

a power source which energizes process gas in an interior of the processing chamber into a plasma state for processing a substrate',

a substrate support which supports a substrate within the interior of

the processing chamber, the substrate support having an upper surface; and

an edge ring assembly comprising:

a conductive lower ring;

a ceramic intermediate ring, the intermediate ring overlying

the lower ring, the intermediate ring adapted to be attached via the lower ring to the power source; and

an upper ring, the upper ring overlying the intermediate ring,

wherein the upper ring has an upper surface exposed to an interior of the processing chamber;

supplying process gas to the chamber;

forming a plasma adjacent the upper surface of the substrate support; and

sequentially processing a plurality of substrates in the plasma processing

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apparatus, wherein the temperature of the upper ring is substantially cooled to an initial temperature after a first substrate is removed from the substrate support and before a subsequent substrate is placed on the substrate support to reduce process drift, see cols. 3 & 4.

Regarding 24: The method of Claim 23, wherein the substrate comprises a semiconductor wafer and the processing step comprises etching the semiconductor wafer with the plasma, see col. 3 lines 40-47.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hubacek.

The teachings of Hubacek have been discussed above.

Regarding claim 6: Hubacek fails to teach the assembly of Claim 1, wherein a lower surface of the upper ring is bonded to an upper surface of the intermediate ring via a thermally conductive elastomer.

Regarding claim 17: The apparatus of Claim 16, wherein the upper ring is bonded to the intermediate ring by a thermally conductive elastomer.

However, Hubacek does teach that the edge ring chuck is secured by using any of the methods and materials known in the art for securing wafer chucks. Additionally, the edge ring components may use a high temperature polymer adhesive such as silicone adhesive.

A thermally conductive elastomer is included in one of those methods/materials known in the art. Thus, it would have been obvious at the time of the claimed invention to secure the components of the ring as recited in claims 6 and 17 of the claimed invention.

5. Claims 10-13, 17, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hubacek in view of Koai et al (US 6,159,299).

The teachings of Hubacek have been discussed above.

Hubacek fails to teach:

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Regarding claim 10: The assembly of Claim 7, further comprising a first bolt having a tapered head at one end and a screw thread at the other end, the first bolt configured to bolt the conductive ring to the RF electrode.

Regarding claim 11: The assembly of Claim 8, further comprising a second bolt having a head at one end and a screw thread at the other end, the second bolt configured to bolt the intermediate ring to the conductive ring.

Regarding claim 12: The assembly of Claim 1, further comprising a conductive washer configured to receive a bolt having a head at one end and a screw thread at the other end, wherein the conductive washer is positioned between the upper ring and the intermediate ring.

Regarding claim 13: The assembly of Claim 12, further comprising a plurality of holes in the upper ring, wherein the plurality of holes receive a cap, the cap having a vent hole configured to release pressure from within the edge ring assembly.

Koai et al teaches a wafer pedestal with a purge ring 280 and a three-piece edge ring 200. Koai et al teaches the top ring 240, middle ring 230, and bottom ring 220 are bolted together by three centering bolts 271, see col.6 lines 18-46.

The motivation to combine the teachings of Hubacek and Koai et al is ensure that the components of the ring are secure and not prone to damage during the process of the wafer. Thus, it would have been obvious at the time of the claimed invention to secure the components of the ring as recited in claims 10-13.

Regarding claim 22: Hubacek also fails to teach the apparatus of Claim 16, further comprising a quartz outer ring surrounding the upper ring, the intermediate ring, the lower ring and the RF electrode.

The purge ring 280 of Koai et al surrounds the components as recited by the claim, however, the ring is not made of quartz it is made of a conductive material, i.e. Al. Nevertheless, quartz and other ceramic materials were discussed by Hubacek and is known for its advantageous chemical and physical properties in the art of semiconducting manufacturing.

Thus, it would have been obvious at the time of the claimed invention to manufacture of the purge ring of Koai of quartz as it comprises the advantageous chemical and physical properties as recited by Hubacek.

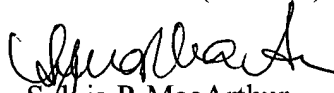
Conclusion

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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the core hours of 9 a.m. and 3 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sylvia R MacArthur
Patent Examiner
Art Unit 1763

August 18, 2005